CLAIMS

1. A process for producing a vinyl polymer terminated with a group having a polymerizable carbon-carbon double bond in the presence of a stable free radical.

2. The process according to claim 1, wherein the group having the polymerizable carbon-carbon double bond in the vinyl polymer is represented by formula (1):

$$-OC(O)C(R^1)=CHR^2 \quad (1)$$

(wherein R^1 and R^2 are the same or different and each represent hydrogen or an organic group having 1 to 20 carbon atoms).

3. The process according to claim 2, wherein in formula (1), R^1 and R^2 are the same or different and each represent hydrogen or a saturated or unsaturated hydrocarbon group having 1 to 10 carbon atoms.

4. The process according to claim 2 or 3, wherein in formula (1), R^1 and R^2 are the same or different and each represent hydrogen, methyl, phenyl, or 1-propenyl.

5. The process according to any one of claims 1 to 4, wherein the vinyl polymer is a (meth)acrylic polymer.

6. The process according to claim 5, wherein the vinyl polymer is an acrylic ester polymer.

7. The process according to any one of claims 1 to 4, wherein the vinyl polymer is a styrene polymer.

8. The process according to any one of claims 1 to 7, wherein the vinyl polymer is produced by living radical polymerization.

9. The process according to claim 8, wherein the living radical polymerization is atom transfer radical polymerization.

10. The process according to claim 9, wherein the atom transfer radical polymerization is performed using a complex of a metal selected from the group consisting of copper, nickel, ruthenium, and iron.

11. The process according to claim 10, wherein a copper complex is used.

12. The process according to any one of claims 1 to 7, wherein the vinyl polymer is produced by polymerizing a vinyl monomer using a chain transfer agent.

13. The process according to any one of claims 1 to 12, wherein the vinyl polymer is produced by reaction between a vinyl polymer having a terminal structure represented by formula (2):

$$-CR^3R^4X \quad (2)$$

(wherein R^3 and R^4 each represent a group bonded to an ethylenically unsaturated group of a vinyl monomer, and X represents chlorine, bromine, or iodine), and a compound represented by formula (3):

$$M^{+-}OC(O)C(R^1)=CHR^2 \quad (3)$$

(wherein R^1 and R^2 are the same or different and each represent hydrogen or an organic group having 1 to 20 carbon atoms, and M^+ represents an alkali metal or quaternary ammonium ion).

14. The process according to any one of claims 1 to 12, wherein the vinyl polymer is produced by reaction between a vinyl polymer terminated with a hydroxyl group and a compound represented by formula (4):

$$XC(O)C(R^1)=CHR^2 \quad (4)$$

(wherein R^1 and R^2 are the same or different and each represent hydrogen or an organic group having 1 to 20 carbon atoms, and X represents chlorine, bromine, or a hydroxyl group).

15. The process according to any one of claims 1 to 12, wherein the vinyl polymer is produced by reaction between a vinyl polymer terminated with an isocyanate group and a compound represented by formula (5):

$$HO-R^5-OC(O)C(R^1)=CHR^2 \quad (5)$$

(wherein R^1 and R^2 are the same or different and each represent hydrogen or an organic group having 1 to 20 carbon atoms, and R^5 represents a divalent organic group having 2 to 20 carbon atoms).

16. The process according to any one of claims 1 to 15, wherein the vinyl polymer has a number-average molecular weight of 2,000 or more.

17. The process according to any one of claims 1 to 16, wherein the vinyl polymer has a ratio (Mw/Mn) of a weight-average molecular weight (Mw) to a number-average molecular weight (Mn) of less than 1.8 according to gel permeation chromatographic measurement.

18. The process according to claim 1, comprising distilling off a solvent from a solution containing the vinyl polymer by heating under reduced pressure in the presence of the stable free radical.

19. The process according to claim 1, wherein the process is carried out under the condition in which the oxygen partial pressure is 10,000 Pa or less.